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ABSTRACT

This manual provides information needed to meet specific standards for certification as a pesticide applicator. The areas discussed include the economic insect pests on livestock and control treatments; the toxicity and hazards of livestock pesticides; and special considerations when applying pesticides. (CS)

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Iowa
Commercial Pesticide Applicator Manual

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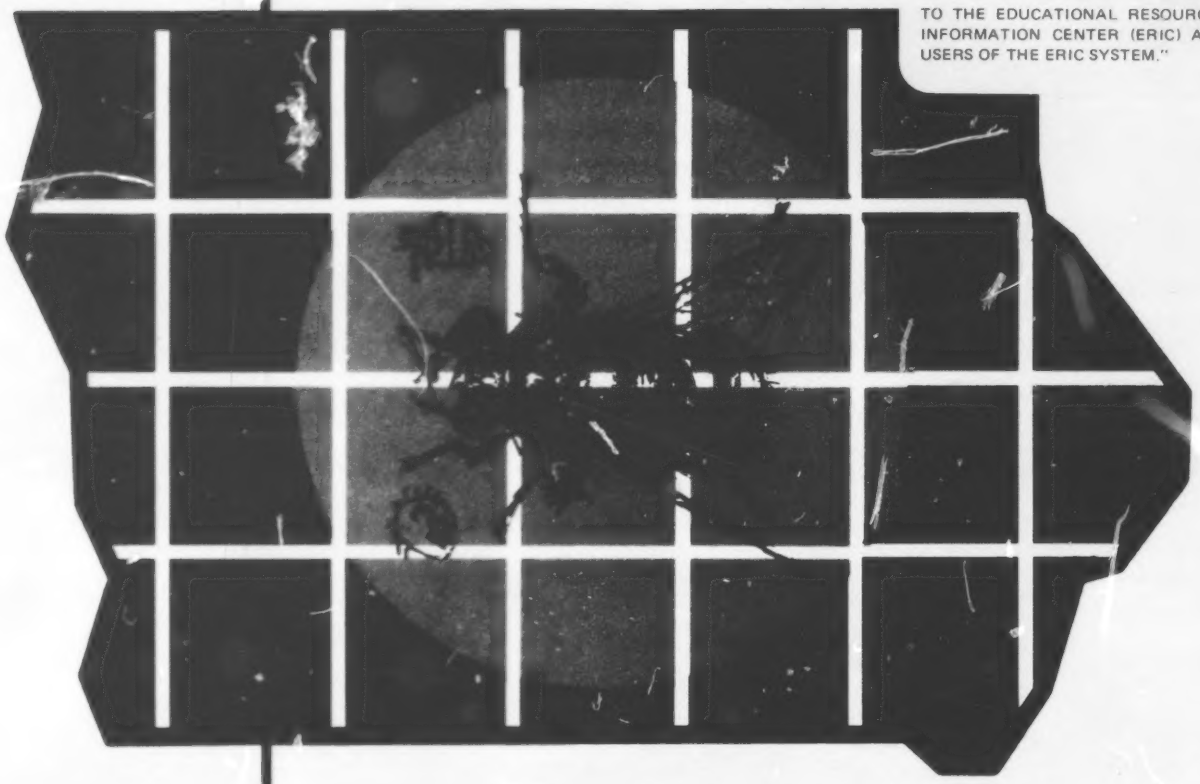
CATEGORY 1E

ANIMAL PEST CONTROL



This manual is to be used for certification training in conjunction with the U. S. Department of Agriculture – U. S. Environmental Protection Agency manual, **Apply Pesticides Correctly,** EPA-335.

Cooperative Extension Service
IOWA STATE UNIVERSITY
Ames, Iowa 50011

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This manual has been developed for individuals wishing to become certified in commercial pesticide applicator category 1E, Animal Pest Control. It contains specific information that an individual must know before becoming certified in category 1E. The manual has been designed to supplement the general information contained in the core manual, **Apply Pesticides Correctly—A guide for commercial applicators** (plus an Iowa State University supplement) and should not be used for certification preparation without referring to the core manual as well.

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LIVESTOCK PRODUCTION

A practical, working knowledge of livestock production is essential before using any pesticide as a tool in a pest management program. Knowledge gained from practical experience can be supplemented by available literature such as:

BEEF CATTLE SCIENCE by Ensminger.
The Interstate Printer and Publisher (4th edition)

or

SWINE PRODUCTION by Krider and Carroll
McGraw Hill Book Co. (4th edition)

Other information on livestock production is readily available from county extension directors.

Prepared by Jerald R. DeWitt, extension entomologist, and Stephen O. Ryan, pesticide training coordinator.

ECONOMIC INSECT PESTS ON LIVESTOCK

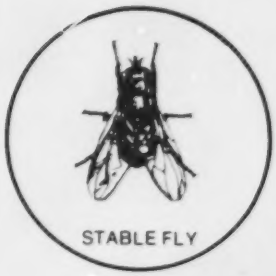
A wide variety of insects attack livestock, but in Iowa only a small number are economic pests. These few insects when multiplied, however, can combine to rob livestock producers of profit as they annoy and harass the animals or spread disease-producing pathogens. The first step in controlling these pests is **identifying the insect or symptoms of an infestation** and determining when a treatment is economically justified.

BEEF CATTLE

Pest	Life Cycle and Damage	Symptoms of Infestation	Indication of Economic Threshold and Control*
FACE FLY	Adult fly overwinters in protected sites; maggots live in fresh pasture manure; several generations per year; peak populations in August.	Inflamed eyes; pinkeye; tear-streaked eyes; flies bunched around eyes.	Presence of flies around eyes; control with sprays, dust bags or feed additives.
HORN FLY	Pupae or maggots overwinter in manure; maggots live in fresh pasture manure; several generations per year; peak in August.	Numerous flies on back and sides; cattle using tail and head to dislodge flies.	Presence of 150 to 200 flies per animal; control with sprays, dust bags or feed additives.
LOUSE	Live year-round on cattle; eggs glued to hair; lice suck blood or feed on skin; heaviest during winter.	Cattle rubbing or scratching; hair missing on neck and around tail.	Presence of live lice and/or scratching; control with sprays, backrubbers or pour-ons.
CATTLE GRUB	Heel fly lays eggs on legs in spring; grubs move through tissues and lodge in back; pupate in spring in pasture.	Cattle gadding or running in fright in May-June; "warbles" in back in winter.	Presence of grubs in marketed cattle; control with pour-ons, sprays or feed additives.

*All treatments (sprays, pour-ons, dusts, etc.) must be consistent with label recommendations. DO NOT apply a pesticide that does not have both the host and pest specified on the label.

DAIRY CATTLE

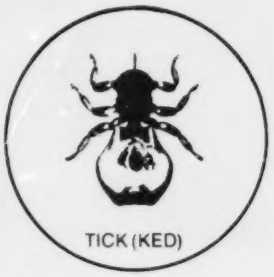
Pest	Life Cycle and Damage	Symptoms of Infestation	Indication of Economic Threshold and Control*
FACE FLY HORN FLY LOUSE	See BEEF CATTLE INSECTS		
 STABLE FLY	Overwinters as maggot or pupa; breeds in strawy-manure in feedlots; multiple generations per year; feeds on blood from legs of cattle.	Flies on lower legs; cattle stomp feet; flies observed on sunny surfaces.	Presence of 3 to 5 flies/leg or stomping; control with sanitation and sprays.
 HOUSE FLY	Similar to stable fly; annoys cattle; may reproduce in 7 to 10 days in strawy-manure; many generations per year.	Flies on back and sides of cattle; flies observed resting on sunlit surfaces.	Presence of annoying flies in and around milking parlor or homes.

SWINE

 MANGE MITE	Spends entire life on the hog; mites burrow, feed and lay eggs in skin; more serious in winter.	Scabby, dried, cracked skin in and around ears and neck; scratching.	Presence of mites or scratching; control with sprays.
 LOUSE	Spends entire life on the hog feeding on blood; eggs laid on hairs; several generations per year; more serious in winter.	Cracked, dried skin; rubbing or scratching.	Presence of lice or eggs on animal; scratching; control with sprays, dusts, bedding granules or a pour-on.

*All treatments (sprays, pour-ons, dusts, etc.) must be consistent with label recommendations. DO NOT apply a pesticide that does not have both the host and pest specified on the label.

SHEEP

Pest	Life Cycle and Damage	Symptoms of Infestation	Indication of Economic Threshold and Control*
 TICK (KED)	Spends entire life on sheep; feeds on blood; female "lays" pupa on wool around neck or belly.	Rubbing or scratching; wool patches missing.	Presence of keds; scratching or rubbing; control with sprays.

POULTRY

LOUSE	Spends entire life on poultry; feeds on skin and feather; eggs glued to feathers; several generations per year; more serious in summer.	Reduced egg production; ruffled feather; emaciated condition; drowsy condition.	Presence of lice; control with sprays, dust or bedding granules.
MITE	Chicken mite lives in cracks and crevices of building; northern fowl mite lives on poultry; all feed on blood; many generations per year.	Reduced egg production; listless, pale about head; dirty feathers; scabby skin.	Presence of mites in building or on poultry; control with sprays or dust.

*All treatments (sprays, pour-ons, dusts, etc.) must be consistent with label recommendations. DO NOT apply a pesticide that does not have both the host and pest specified on the label.

Timing of Treatments

Insecticide treatments are usually applied to animals

- —as a preventive treatment before pests are observed (e.g. pre-farrowing treatments of sows for mange and/or lice or for cattle grubs.)
- —or when an infestation is observed (e.g. an outbreak of lice on cattle.)

Timing the treatment to the life cycle of the insect is generally not important except with cattle grubs. The cattle grubs, northern and common, hatch from eggs laid on hairs on the legs of cattle in May or June in Iowa (fig. 1). The grubs migrate through the animal's tissues until they arrive at the esophagus or spinal canal region where they grow. Treating grubby cattle with a systemic in-

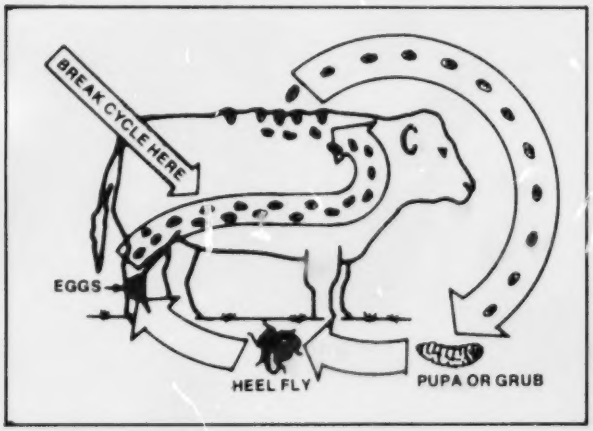


Fig. 1. Life Cycle of Cattle Grub.

secticide while the grubs are in these vital areas may lead to a "grub reaction" (host-parasite reaction). This undesirable reaction is characterized by bloating, salivation, hind quarter paralysis or death of the animal. It is caused by toxins released by the dying grubs. Applicators can avoid grub reactions by treating for cattle grubs only during the "safe period"—the time when the grubs are small and not in vital areas. The origin of the cattle must be known in order to determine the safe treatment period (table 1).

Using cattle grub pour-ons for the control of **cattle lice** during the winter (after safe treatment date) may be hazardous to the cattle if grubs are still present in the animals.

Occasionally, cattle treated with a systemic cattle grub insecticide may show signs of some type of adverse reaction to either the insecticide or may experience a "grub reaction" (host-parasite reaction). The proper treatment of af-

Table 1. Safe Treatment Dates for Treating Grubby Cattle

ORIGIN OF CATTLE	SAFE TREATMENT PERIOD
Texas and Gulf States	May 1-July 31
Oklahoma and Kansas	June 1-Aug. 31
Iowa, Nebraska and Colorado	Aug. 1-Oct. 31
North and South Dakota, Wyoming and Montana	Aug. 15-Nov. 15
Canada	Sept. 1-Nov. 30

fected cattle is based upon the correct diagnosis of the problem. Symptoms of an acute overdose of a systemic insecticide in cattle and a typical "grub reaction" are listed in table 2. A veterinarian should be contacted whenever any problem develops after using a grub insecticide.

Table 2. Symptoms of Pesticide (Organophosphate) Poisoning and "Grub Reaction" in Cattle.*

	Insecticide Overdose	Grub Reaction
Bloat	Yes	Yes
Diarrhea	Yes	No
Incoordination	Yes	Yes
Limp Legs	No	Yes
Excess Saliva	Yes	Yes
Spitting out Feed	No	Yes

*Revised from **Diagnosis and Treatment of Adverse Reactions in Cattle Treated for Grubs with a Systemic Insecticide** by D. L. Nelson et al. 1967. Veterinary Medicine/Small Animal Clinician. Vol. 62(7): 683-4.

Feed-Through or Feed Additives

Several livestock insecticides are fed directly to the animal in order to suppress the pest population.

a. **Systemic feed-throughs for beef cattle**—Ronnel (Trolene) or famphur (Famix) may be added to mineral for a specific number of days. Normal daily consumption over the feeding period will ensure adequate levels of the insecticide in the cattle and eliminate cattle grubs. This treatment is not labeled for use on other livestock.

a. **Non-systemic feed-throughs for beef cattle**—Ronnel, Rabon or phenothiazine may be added to the mineral or offered in a

block formulation from May-September in order to suppress horn and face fly problems on pastured cattle. The insecticide passes through the animals digestive tract and residues remain in the manure which inhibit face and horn fly development.

Pour-on Treatments

Pour-on insecticides are popular for controlling cattle grubs. They are applied with a long-handle dipper over the backline of the animal. Only small amounts (usually 0.5 fl oz per 100 lb body weight) are needed for effective control.

Cattle grub pour-ons such as Co-Ral, Neguvon, Ruelene, SPOTTON, Tiguvon and Warbex should be used without diluting with water. Ruelene 25% e.c., however, must be diluted. Using a pour-on incorrectly may lead to ineffective grub control or damage to the animal. Using a pour-on on livestock not listed on the label may lead to illegal residues and/or harm to the animal. Pour-ons are also available for controlling lice on cattle and swine.

Ready-to-Use Sprays

Some insecticides are formulated ready-to-use products such as Ciovap. Other formulations of Ciovap, however, must be mixed with water to provide a useable, safe treatment.

Failure to follow directions in mixing insecticides may lead to ineffective control due to diluting a ready-to-use product or injuring the animal due to not diluting a concentrated formulation.

Contact Sprays

Using insecticides (Co-Ral, Delnav, Korlan, Rabor or Toxaphene, etc.) as a spray treatment as directed by the label will not result in residue or toxicity problems on livestock. Mixing stronger-than-labeled concentrations or overtreating livestock may cause residue problems or harm the animal. Some sprays may use an oil as the carrier rather than water. Oil gives a more even coverage and prolongs the effectiveness of the toxicant. Excessive oil sprayed on an animal, especially swine, on sunny days may cause skin irritation.

Residual Sprays

Certain insecticides (Baytex, Cygon, Korlan, Rabon and Ravap) are used as residual sprays for controlling house and stable flies around feedlots. They are applied to structures in and around the feedlot where the flies congregate. They are effective for 2 to 6 weeks depending upon moisture and sunlight. Applicators should avoid treating over feedbunks, water and/or milking equipment. Some residual insecticides may be used at **labeled lower concentrations** directly on livestock. Improper use of residual insecticides, however, may cause illegal residues in milk, meat, or eggs or may result in the death of livestock.

Backrubbers and Dust Bags

Insecticides used in backrubbers are commonly mixed with an oil (diesel, #2 fuel or mineral oil). Used motor oil should never be used as a carrier because it may harm livestock. Dust bags containing Ciodrin, Co-Ral, malathion, methoxychlor or Rabon dusts are commonly used for face fly, horn fly and louse control on cattle. The effectiveness of the dust bags is enhanced when the cattle are forced to use the bag daily. Dust bags should be checked frequently for caked dust due to moisture or for height readjustment and refilling.

TOXICITY AND HAZARD OF LIVESTOCK INSECTICIDES

LD_{50} Values

The **LD_{50}** values of insecticides used for the control of insect pests on livestock vary from moderately toxic to relatively nontoxic materials.

The acute dermal (skin) toxicity of an insecticide is usually more important than the acute oral toxicity because most livestock insecticides are applied to the animal as either sprays or dusts. Few insecticides are fed directly to livestock for insect control. Only several systemics (ronnel and famphur) for cattle grub control or three feed-throughs (ronnel, Rabon or phenothiazine) are used in this manner.

The acute dermal (mg/kg) LD_{50} values of some commonly-used livestock insecticides are:

	mg/kg	
VAPONA	107	MOST TOXIC
TIGUVON	330	
CIODRIN	385	
TOXAPHENE	780	
CO-RAL	860	
MALATHION	4444+	
KORLAN	5000+	LEAST TOXIC

Although the LD_{50} value indicating toxicity for

any given insecticide does not change, the **ralative hazard** of any insecticide will vary with the **formulation.** For example, Co-Ral 25% wettable powder is less hazardous to the applicator than the 11.6% emulsifiable concentrate. Ready-to-use insecticides such as Ciovap are less hazardous than the emulsifiable concentrate such as Vapona.

Systemic Treatments

Certain insecticides have the capability of entering the bloodstream of animals after treatment and being transported in their toxic state throughout the system. Insect pests which feed on blood, then, receive a lethal dose of the insecticide. These insecticides are called **systemics.** Most systemics are used for the control of cattle grubs on beef cattle. They are: Co-Ral, Neguvon, Ruelene, Tiguvon, SPOTTON and Warbex. They are not used on lactating dairy cows because unwanted residues would be excreted in the milk.

Combination Treatments

A treatment of a combination of insecticides should not be given to any animal unless such directions are stated on the label. An unlabeled combination treatment may result in pesticide toxicity to the animal. Systemic cattle grub insecticides should not be applied in conjunction with other insecticides, oral drenches or internal medications for worm control or after phenothiazine.

Different Formulations of the Same Insecticide

Before using any insecticide on livestock, the label must be read thoroughly. A single insecticide may be packaged under several different **formulations.** The insecticide ronnel or Korlan, for example, is available as:

24.5% pour-on
5% granules
2.5% pressurized spray
24% emulsifiable concentrate

It is important to use the correct formulation for proper and safe pest control. Some formulations of toxaphene are labeled for pests on field crops but not on livestock. These products should not be used on livestock even though toxaphene is labeled for livestock pest control. Use toxaphene that is labeled for use on livestock.

Chlorinated Hydrocarbon Insecticides

Chlorinated hydrocarbon insecticides (toxaphene and lindane) may be used as spray applications for the control of certain insect pests on some livestock. However, they are long lasting and leave residues which may persist for weeks. Therefore, they are **not recommended** for use on or around dairy cattle or poultry because their use, as well as the use of other chlorinated hydrocarbon insecticides such as DDT, chlordane, heptachlor, aldrin or dieldrin may result in illegal residues in milk or eggs. Applicators can easily prevent residue problems in livestock by not using chlorinated hydrocarbon insecticides on dairy and poultry farms.

Applicators can also help prevent residue problems with chlorinated hydrocarbons by:

1. Being aware of possible residue problems when using chlorinated hydrocarbons on nondairy farms.
2. Preventing drift or run-off of insecticides on land adjacent to dairy farms.
3. Using clean equipment when treating diary herds.

SPECIAL THINGS TO CONSIDER WHEN APPLYING LIVESTOCK INSECTICIDES

Age of the Animal

Young, unweaned livestock generally should not be treated with any insecticide unless the label clearly states that such treatments are safe. For example, calves less than 3 months old should not be treated with grubicides, and unweaned pigs should not be treated for mange or lice unless labeled products are available. Treating livestock during weaning may also be stressful to the animal.

Breed of Livestock

Labeled insecticides may be used on all breeds of livestock without concern with one exception. Warbex, a cattle grub pour-on, should not be used on Brahman and Brahman crossbreeds because an insecticide reaction may occur. Other pour-ons have not been shown to cause this type of problem nor have other breeds shown this reaction to Warbex.

Some horses may be sensitive to certain insec-

ticides. Treatments may cause an allergic reaction. Treat horses or other sensitive animals only after one animal has been successfully pre-treated the prior day without any observable reaction.

Stress

Livestock should not be treated with any insecticide when under **stress** from:

- —shipping
- —vaccination
- —dehorning
- —castration
- —disease
- —exhaustion
- —weaning

Treat only **healthy** livestock with pesticides.

Slaughter Interval

Insecticide residues in excess of determined tolerance levels (or action levels) are not allowed in meat, milk or eggs. In order to avoid excessive undesirable residues in animal products, slaughter intervals are established for all insecticides used on livestock. The slaughter interval is the time (in days) required by law before an animal (or product) can be slaughtered (or consumed) after an insecticide treatment. Slaughter intervals vary from 0 to 35 days (or more) depending upon the insecticide used and its concentration (see table 3). The failure to mix insecticides properly or overtreating any animal may lead to residues exceeding tolerance levels even though slaughter intervals are observed. Livestock producers should be aware of slaughter intervals **before** any treatment is made.

Table 3. Slaughter Intervals for Cattle Grub Pour-ons on Beef Cattle.

INSECTICIDE	SLAUGHTER INTERVAL (days)
Co-Ral	0
Ruelene	7
Neguvon	14
Tiguvon	35
Warbex	35

Freshening Interval

Although many insecticides cannot be used on lactating dairy cows, they may be safely (and legally) used on nonlactating animals. If the cow, however, freshens soon after the treatments, illegal insecticide residues may be present in the milk. A **freshening interval** is given for some insecticides. It is the time (in days) which must elapse after an insecticide treatment is made before the milk can be marketed.

SUGGESTED REFERENCES

Pm-204	Poultry Pests and Their Control
Pm-294 (Rev.)	Beef Cattle Insects and Their Control
Pm-319 (Rev.)	The Cattle Grub and Its Control
Pm-320 (Rev.)	Insect Pests of Sheep
Pm-322	Dairy Cattle Insects and Their Control
IC-328 (Rev.)	Summary of Iowa Insect Pest Control Recommendations
Pm-627	Controlling Hog Mange and Lice
IC-423	Insecticide Use Chart for the Dairy Farm

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